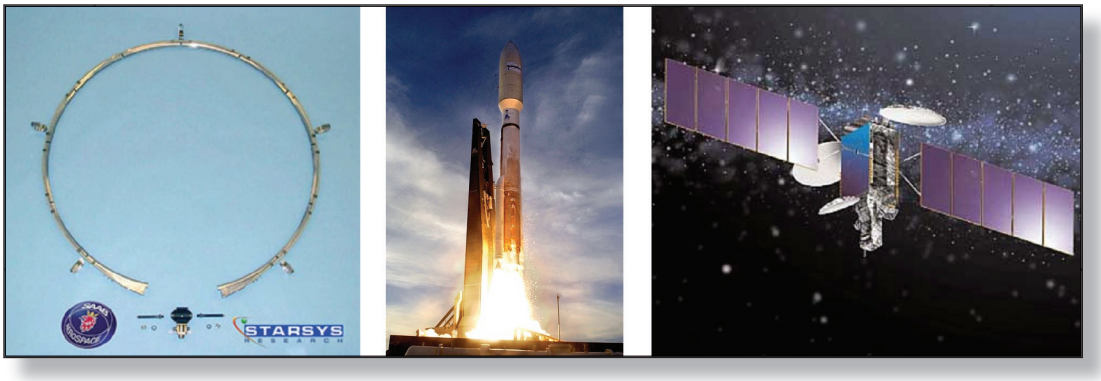
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Air Force SBIR/STTR Celebrating 100 Years of Air & Space Innovation

Success Story

LOW-SHOCK CLAMP-BAND SATELLITE SEPARATION SYSTEM



The Space Vehicles Directorate and Starsys Research Corporation developed a low-shock satellite release technology to separate spacecraft from a launch vehicle with a clamp-band system while imparting very low shock loads to the spacecraft. A Starsys Research and Saab-Ericsson Space commercial system using the technology claimed the first-flight heritage when it released the Rainbow-1 satellite from an Atlas V rocket.

Air Force Research Laboratory
Wright-Patterson AFB OH

Accomplishment

Under a Small Business Innovation Research contract with the directorate, Starsys Research developed a clamp-band opening device which uses the patented Fast Acting Shockless Separation Nut (FASSN) technology to restrain the clamp-band tension bolts with a double helix, flywheel nut. A pyro-compatible pulse releases the flywheel nut, which spins up and ejects the tension bolts.

The strain energy in the clamp band is then converted to rotational energy in the flywheel nut, allowing the two mating halves of the structure interface to separate with extremely low shock. The successful use of this system in the Atlas V/Rainbow-1 mission confirms its commercial and military potential.

Background

These new low-shock release mechanisms can support heavier payloads while imparting shock loads on the order of tens of g's, as opposed to thousands, when compared to classical spacecraft release mechanisms with pyrotechnic-based technology. Because they can be reset and reused, these mechanisms will also decrease life-cycle costs.

According to Mr. Scott Tibbitts, the president of Starsys Research, the low-shock release mechanism will change the way spacecrafts are released from launch vehicles. Shock has always been a problem for spacecraft designers. In a conventional release system, shock is created when the energy in a highly tensioned bolt is instantaneously released.

Sensitive spacecraft electronics must be built to withstand this release shock, which adds significantly to the cost of the spacecraft. In contrast, the FASSN technology provides an instantaneous shock-free release. Over the next several years, Starsys Research and Saab Ericsson Space expect this revolutionary device to become the industry standard.

Space Vehicles
Emerging Technology

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-VS-24)